

U.S. Fish & Wildlife Service

Fishing and Hunting Recruitment and Retention in the U.S. from 1990 to 2010

*Addendum to the 2011 National
Survey of Fishing, Hunting, and
Wildlife-Associated Recreation*

Report 2011-5



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March 2015

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This report is intended to complement the National and State Reports for the 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation. The conclusions in this report are the authors' and do not represent official positions of the U.S. Fish and Wildlife Service.

The authors thank Matthew Fuller, Leif Anderson, and Karma Norman for valuable input on this report.

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Introduction

The *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR)* indicates that fishing participation in the U.S. fell from 35.6 million individuals in 1991 to 33.1 million in 2011, and hunting stayed relatively flat over the period at 14.1 million and 13.7 million, respectively. Overall the number of sportspersons that participated in either hunting or fishing declined from 40.0 million in 1991 to 37.4 million in 2011. This decline is of concern to those involved with wildlife-related recreation, especially considering that the population of the U.S. increased about 24% over the same period¹. While it is clear that participation declined, it is less clear whether the decline was attributable to declining recruitment of new participants, declining retention of former participants, or both. This report examines recruitment and retention using data from the 1991, 1996, 2001, 2006, and 2011 *FHWAR*.

This report sheds light on numerous questions regarding fishing and hunting recruitment and retention. What percent of children living at home have ever been exposed to fishing? How much did this percentage change from 1990 to 2010? How much higher is the percent of boys exposed to hunting than girls? At what age do individuals tend to stop fishing and hunting? How much lower was retention of anglers and hunters in 2010 compared to 1990? What income groups had relatively large changes in retention of anglers and hunters from 1995 to 2010?

Report Organization

This report first analyzes recruitment and then addresses retention. More specifically, the report is organized as follows.

Recruitment

Age of Initiation: The age at which initiation into fishing and hunting occurs

¹ Intercensal Estimates of the United States Resident Population, U.S. Census Bureau. <http://www.census.gov/popest/data/intercensal/index.html>



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is examined, as well as differences in age of initiation among residents of urban and rural areas.

Trend in Recruitment: The trend in recruitment from 1990 to 2010 is analyzed using information on the percent of children living at home who have ever hunted or fished. Socioeconomic characteristics of recruits are incorporated so that trends can be analyzed for different population segments.

Participation of Children in 2010: This section examines the characteristics of sons and daughters living at home who participated in fishing and hunting in 2010. Their socioeconomic characteristics

are analyzed as well as the fishing and hunting activity of their parents.

Retention

Age of Dropouts: This section examines the age at which individuals stop hunting or fishing. Additionally, it examines how the retention rate changed from 1990 to 2010.

Characteristics of Dropouts: This section examines the relationship between various socioeconomic characteristics and the retention rate in fishing and hunting.

Trend in Retention: The trend in retention from 1990 to 2010 is analyzed in detail. The trend analysis incorporates

socioeconomic characteristics to assess trends among different population segments.

Data and Definitions

All reported data contained herein are from the 1991, 1996, 2001, 2006, and 2011 FHWAR surveys. This report makes extensive use of data from the *screen phase* of the FHWAR surveys because these data are uniquely suited to examine recruitment and retention in detail.

The 1991, 1996, 2001, 2006, and 2011 FHWAR surveys² have the same two-phase construction. The first is the *screen phase* in which the Census Bureau interviews a sample of households nationwide to locate individuals who will likely participate in hunting, fishing, or wildlife watching in the relevant survey year. The second is the *detail phase* in which those selected as likely anglers, hunters, and wildlife watchers from the *screen phase* are given detailed interviews about their recreation activities.

Screen data from each FHWAR survey are particularly useful in analyzing recruitment. To determine individuals who are likely to participate in wildlife recreation in the survey year, respondents were asked questions about the historical recreation activities of household members. In most cases, one adult household member provided information for all household members about whether they had ever participated in wildlife-related recreation and, if so, what year was their most recent activity. Because the *screen* queries respondents about wildlife recreation activities for years prior to the *detail* survey year, we are able to identify respondents who have ever participated in hunting or fishing, which is well suited for indicating exposure or “recruitment” into the sport.

Data from the *screen phase* are also useful in analyzing retention. For individuals who have participated in hunting or fishing at some point, there

² FHWAR documents are available on the U.S. Census Bureau website: <http://www.census.gov/prod/www/fishing.html>



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is information available to indicate the most recent year in which he or she participated. This information can be used to identify individuals who have effectively dropped out of the sport. In this report, individuals are considered active participants if they participated in the respective activity in at least one of the three years prior to the *detail* survey years of 1991, 1996, 2001, 2006, or 2011. Alternatively, individuals are considered dropouts from fishing or hunting if they have fished or hunted at some point in their lives but did not participate in one of the three years prior to the *detail* survey years of 1991, 1996, 2001, 2006, or 2011. For example, for the 2011 FHWAR, an individual is considered a dropout from fishing if she fished at some point in her life but did not participate in 2010, 2009, or 2008.

Lastly, the following discussion focuses mostly on the changes in the point estimates from between the 2000 and 2010 surveys. Not all changes discussed are statistically significant, but many are, and are so noted. For changes that are not statistically significant, one cannot with a high degree of confidence assert that changes did not occur by chance. A lack of statistical significance means that there is greater than 10% probability that the differences shown could have occurred by chance.

Recruitment

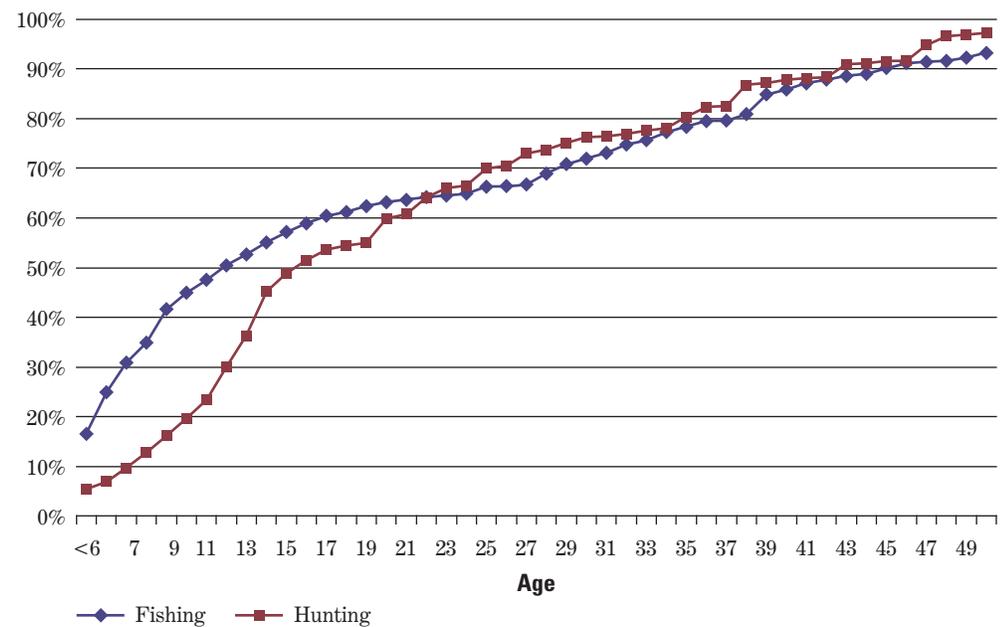
Age of Initiation

The FHWAR *screen* contains information about first-time hunting or fishing experiences for the year immediately preceding the *detail* survey year. Individuals who hunted or fished in 2010 were asked a follow-up question about whether it was their first year to participate. Using the responses to this question, one can obtain the distribution of first-time anglers or hunters by age. These distributions are displayed in Chart 1 as cumulative percentages. Displaying the distributions in this manner helps reveal what age groups are critical for exposure to hunting or fishing.

The following should help clarify the meaning of the cumulative percentage curves in Chart 1. The line for fishing indicates that in 2010 17% of all first time anglers were under 6 years old³, 57% were 15 or under, and 63% were 20 or under. If the distribution of first time anglers and hunters is relatively consistent over time, then the relationship between age and first time anglers and hunters seen in 2010 alone would resemble the rate of exposure for all anglers and hunters. In other words, one can estimate that 63% of all individuals who have ever participated in fishing were exposed to it by the time they were 20 years old.

Chart 1 reveals that individuals are typically exposed to fishing at a younger age than hunting. Forty five percent of first-time anglers were 10 years old or younger compared to 20% of first-time hunters. However, the cumulative percent of individuals hunting for the first time increases rapidly through the teenage years, so roughly two thirds

Chart 1. Cumulative Percent of First-Time Hunters and Anglers, by Age: 2010



of both first time anglers and hunters are 20 years of age or younger: 60% of hunters and 63% of anglers, respectively. This finding underscores the importance of recruitment during the adolescent years. However, it also means that about a third of both first time anglers and first time hunters in 2010 were 21 and over⁴.

It may come as a surprise that about a third of first-time anglers and hunters were 21 and over. While adolescence is the most important time for recruitment, young adults and the middle aged also provide substantial numbers of new recruits. While this finding may be surprising, it also indicates that new additions to hunting and fishing need not necessarily be adolescents.

³ The *screen* does not query the activities for individuals under 6. The number of individuals in 2010 who were first-time anglers before 6 was approximated by tallying the 6 year old individuals who participated in 2010 and also indicated it was not their first time.

⁴ The percentages of first-time hunters and anglers over 20 were very similar using data from the 2006 and 2001 surveys. Contact the author for results using the 2006 and 2001 data.

The participation curves in Chart 1 can also be produced for individuals with different socioeconomic characteristics. Chart 2 displays the cumulative percent of first-time hunters for rural and urban residents separately. Residents of rural areas participate for the first time at a younger age than residents of urban areas: 39% of first-time hunters living in rural areas are 12 or younger, compared to 26% of first-time hunters living in urban areas. Research suggests that those initiated into hunting at younger ages tend to have higher levels of dedication to the sport and tend to be more active hunters later in life⁵. Consequently, the finding that individuals in rural areas are more likely to participate at earlier ages than those in urban areas is not trivial. Chart 3 displays the cumulative percent of first-time anglers for rural and urban residents separately. As we observed with hunters, rural anglers tend to start fishing at younger ages than urban anglers.

⁵ See the following publications for more information.

Applegate, J. E. (1977) Dynamics of the New Jersey sport hunting population. *Trans. North Am. Wildl. and Nat. Resour. Conf.*, 42: 103-116.
 Applegate, J. E. (1982) A change in the age structure of new hunters in New Jersey. *Journal of Wildlife Management.*, 46: 490-492.
 O'Leary, J. T., J. Behrens-Teppe, F.A. McGuire and F. D. Dottavio. (1987). Age of first hunting experience: results from a nationwide recreation survey. *Leisure Sciences.*, 9: 225-233.

Chart 2. Cumulative Percent of First-Time Hunters, by Age and Residency: 2010

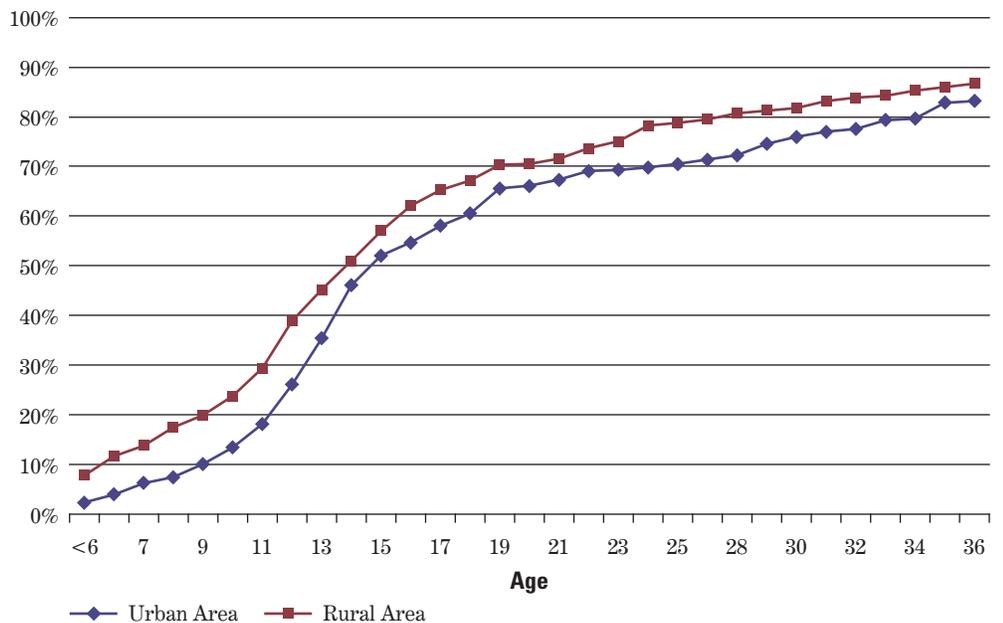
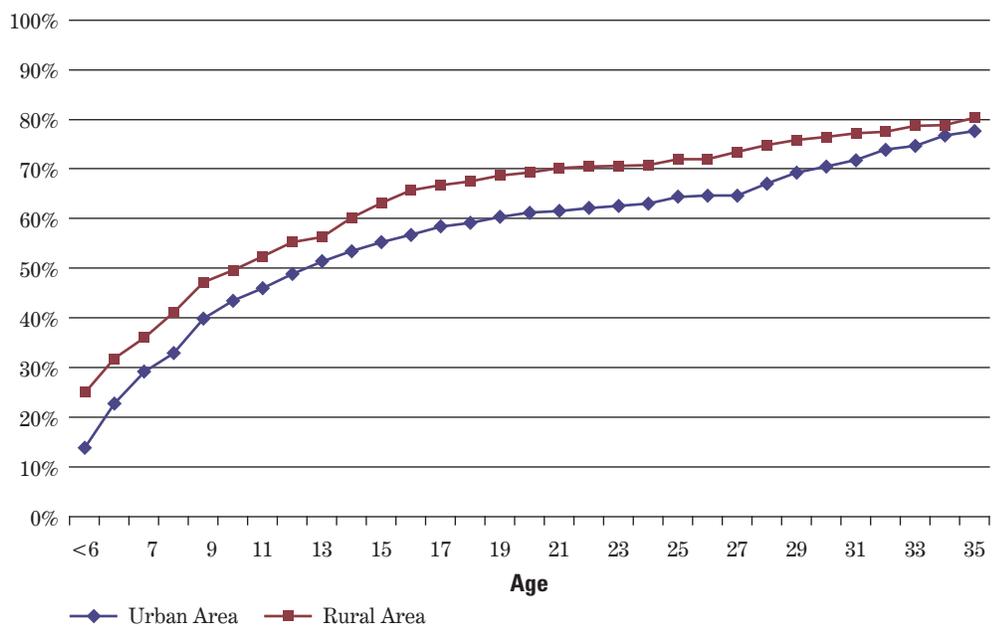


Chart 3. Cumulative Percent of First-Time Anglers, by Age and Residency: 2010



Trend in Recruitment

Overall Trend

The trend in recruitment from 1990 to 2010 is analyzed using data available from the *screen phase* of the *FHWAR* surveys. The *screens* contain information on whether household members have ever participated in fishing and hunting. They also contain information about the relationship of each household member to the reference person. The reference person is the household member who owns, leases, or rents the residence that was selected in the sample. Thus, one can ascertain whether household members are the spouse, child, or parent of the reference person. We focus this trend analysis on children of reference persons living at home. Given the ages of initiation (Chart 1), the majority of new hunters or anglers fall into this category.

Table 1 displays the percentages of children living at home who had ever participated in fishing and hunting by age cohort in 1990, 1995, 2000, 2005, and 2010. These percentages represent the rates at which children were initiated into hunting and fishing, hence we refer to them as initiation rates.

The initiation rate for children of any age declined steadily for both fishing and hunting from 1990 to 2000. However, the decline in both levelled off from 2000 to 2010. The fishing initiation rate for children of any age fell from 53% in 1990 to 50% in 1995 to 42% in 2000 and 2005, and 43% in 2010. This pattern was nearly the same for the hunting rate: 12% in 1990, 10% in 1995, and 8% in 2000, 2005, and 2010.

Table 1. Initiation Rates* of Children Residing at Home by Age Cohort

	2010	2005	2000	1995	1990
Fishing					
<i>Age</i>					
Any Age	43%	42%	42%	50%	53%
6–9	37%	39%	38%	45%	49%
10–12	48%	46%	46%	55%	57%
13–19	45%	46%	46%	53%	56%
20+	40%	36%	34%	45%	48%
Hunting					
<i>Age</i>					
Any Age	8%	8%	8%	10%	12%
6–12	4%	4%	4%	4%	5%
13–19	10%	11%	12%	14%	16%
20+	12%	11%	13%	16%	20%

*The initiation rate is the percent of children residing at home who have ever participated in hunting and fishing.



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Trend by Socioeconomic Characteristics
Tables 2 and 3 present the trend in the initiation rate of children living at home by socioeconomic characteristics, including geographic region of residence, gender, ethnicity, race, urban or rural residence, and household income.

Incorporating these characteristics in the analysis permits a greater understanding of the population segments that experienced the largest changes. To simplify the discussion, this section focuses on the trend for children of any age living at home rather than the trend by age cohorts. A similar trends analysis by age cohorts can be performed using the data provided in appendix tables A-1 and A-2.

To examine changes by household income categories, we apply the inflation rate over a ten year period to make comparisons between 2000 and 2010.⁶ Using the amount of inflation in the

⁶ Income information in 2000 was adjusted to approximate 2010 income levels. The Consumer Price Index rose 27% from 2000 to 2010. The income categories from 2000 were increased by 27%, and then were assigned to the closest 2010 income categories. 2000 income categories were assigned to the 2010 income categories in the following manner:
Under \$20,000 = Under \$25,000₂₀₁₀
\$20,000–\$29,999₂₀₀₀ = \$25,000–\$39,999₂₀₁₀
\$30,000–\$74,999₂₀₀₀ = \$40,000–\$99,999₂₀₁₀
\$75,000 or more₂₀₀₀ = \$100,000 or more₂₀₁₀.

Consumer Price Index (CPI) over a ten year period makes the income categories collected in the 2000 and 2010 surveys roughly comparable. However, this is not done for 15 and 20 year intervals because the collected income categories don't match up well when applying CPI inflation. Consequently, for years 1990 and 2005 in Tables 2–5 the percentages for different income levels are denoted “NA.”

Understanding the concept of *percent change* in the initiation rate is important to appropriately compare changes across different population segments. Tables 2 and 3 present both the *difference* in the initiation rate and the *percent change* in

Table 2. Fishing Initiation Rate for Children Residing at Home by Selected Characteristics: 1990, 1995, 2000, 2005, and 2010

	2010	2005	2000	1995	1990	Difference 2000–2010	Percent Change 2000–2010
U.S. Total	43%	42%	42%	50%	53%	0.9%	2.0%
Geographic Regions							
New England	41%	41%	40%	51%	49%	1.7%	4.3%
Middle Atlantic	36%	34%	33%	43%	42%	3.1%	9.5%
East North Central	54%	47%	45%	50%	57%	**8.4%	18.6%
West North Central	59%	61%	60%	65%	70%	-1.1%	-1.9%
South Atlantic	40%	41%	40%	49%	49%	0.6%	1.4%
East South Central	45%	51%	48%	50%	57%	-2.8%	-5.8%
West South Central	39%	45%	40%	53%	52%	-0.9%	-2.2%
Mountain	47%	45%	51%	59%	64%	-4.2%	-8.2%
Pacific	35%	32%	37%	43%	49%	-2.7%	-7.2%
Gender							
Male	50%	49%	50%	59%	62%	0.2%	0.3%
Female	34%	35%	33%	39%	42%	1.4%	4.2%
Ethnicity							
Non-Hispanic	46%	46%	45%	53%	55%	1.5%	3.3%
Hispanic	26%	22%	24%	26%	31%	1.5%	6.0%
Race							
White	49%	47%	46%	55%	58%	**3.4%	7.4%
Black	21%	23%	20%	23%	27%	1.3%	6.6%
Asian	21%	19%	23%	31%	34%	-2.3%	-9.6%
Other	32%	59%	37%	32%	35%	-4.5%	-12.2%
Population Density							
Urban Area	38%	38%	38%	45%	48%	0.0%	0.1%
Rural Area	56%	56%	52%	60%	63%	*3.9%	7.5%
Annual Household Income (2010 dollars)							
Under \$25,000	31%	NA	27%	NA	NA	3.2%	11.7%
\$25,000–\$39,999	36%	NA	35%	NA	NA	0.4%	1.3%
\$40,000–\$99,999	49%	NA	49%	NA	NA	0.4%	0.8%
\$100,000 or More	56%	NA	55%	NA	NA	0.7%	1.2%

*Difference is significant at 90% level of significance.

**Difference is significant at 95% level of significance.

Note: The difference is the initiation rate in 2010 minus the initiation rate in 2000, so for U.S. Total it is given by 42.7% – 41.8%, which equals 0.9%. The percent change in the initiation rate is measure of relative change that makes the difference a percent of the initial rate in 2000. The percent change in the U.S. Total is given by the expression ((42.7 – 41.8) ÷ 41.8) × 100, which equals 2.0%.

the initiation rates over the periods from 2000 to 2010. The difference is a measure of absolute change while the *percent change* is a measure of relative change. A measure of relative change should be used to compare which segments of the population experienced the sharpest or quickest change in participation.

An example using differences by race will illustrate the two concepts and offer a better understanding of why the use of a relative change is important. Table 3 indicates that the *difference* in the hunting initiation rate from 2000 to 2010 for Whites was 0.9% and for Non-Whites was 0.5%. The difference is derived by subtracting the initiation rate in 2000

from the initiation rate in 2010, which for Whites was $10.7\% - 9.8\% = 0.9\%$ and for Non-Whites was $2.4\% - 1.9\% = 0.5\%$. Considering this small increase alone, one would conclude that hunting initiation among Whites increased faster than it did for Non-Whites. However, this ignores the fact that in 2000 the initiation rate was substantially higher among Whites: 9.8% versus 1.9%.

To appropriately discern whether Whites or Non-Whites experienced the bigger increase in the initiation rate, a measure of relative change is needed to account for their initial differences in 2000. This measure of relative change is contained in the *percent change* column. The *percent*

change for Whites is calculated by the expression $((0.107 - 0.098) \div 0.098) \times 100$, which equals 9%, and for Non-Whites it is given by $((0.0243 - 0.0188) \div 0.0188) \times 100$, which equals 29.1%. When the higher initial starting value is taken into account, hunting initiation rose relatively more among Non-Whites.

The *percent changes* in fishing initiation from 2000 to 2010 reveal that some areas experienced an increase over the period while others experienced decline. The East North Central region and Middle Atlantic region both experienced relatively sharp increases at 18.6% and 9.5%, respectively, whereas the Mountain and Pacific regions experienced

Table 3. Hunting Initiation Rate of Children Residing at Home: by Selected Characteristics: 1990, 1995, 2000, and 2010

	2010	2005	2000	1995	1990	Difference 2000–2010	Percent Change 2000–2010
U.S. Total	8.4%	8.1%	8.4%	10.0%	12.5%	-0.1%	-0.8%
Geographic Regions							
New England	3.9%	3.3%	4.6%	5.1%	7.4%	-0.6%	-13.8%
Middle Atlantic	3.6%	5.8%	6.0%	7.4%	8.6%	** -2.4%	-40.1%
East North Central	11.8%	8.5%	8.8%	9.0%	13.0%	3.1%	34.9%
West North Central	18.3%	14.9%	15.2%	18.1%	18.4%	3.1%	20.3%
South Atlantic	7.5%	7.8%	7.6%	9.9%	12.5%	-0.1%	-1.5%
East South Central	15.5%	15.7%	16.0%	16.2%	20.0%	-0.6%	-3.6%
West South Central	9.1%	11.5%	11.0%	14.1%	17.1%	-1.9%	-17.4%
Mountain	10.5%	8.7%	11.1%	12.5%	15.4%	-0.6%	-5.6%
Pacific	3.7%	3.9%	4.2%	5.2%	7.2%	-0.5%	-12.0%
Gender							
Male	12.4%	12.5%	13.6%	16.7%	20.3%	-1.2%	-8.9%
Female	3.8%	3.4%	2.7%	2.6%	3.7%	* 1.1%	39.1%
Ethnicity							
Non-Hispanic	9.9%	9.3%	9.4%	10.8%	13.4%	0.5%	4.9%
Hispanic	1.4%	2.6%	2.8%	3.4%	4.1%	* -1.4%	-49.3%
Race							
White	10.7%	9.7%	9.8%	11.6%	14.4%	0.9%	9.0%
Non-White	2.4%	2.3%	1.9%	3.7%	3.8%	0.5%	29.1%
Population Density							
Urban Area	5.0%	4.9%	5.4%	6.6%	9.0%	-0.4%	-6.9%
Rural Area	18.2%	19.0%	16.8%	18.0%	20.6%	1.4%	8.3%
Annual Household Income (2010 dollars)							
Under \$25,000	5.6%	NA	5.1%	NA	NA	0.5%	9.0%
\$25,000–\$39,999	7.5%	NA	7.9%	NA	NA	-0.4%	-4.7%
\$40,000–\$99,999	10.2%	NA	10.3%	NA	NA	-0.1%	-1.4%
\$100,000 or More	9.9%	NA	9.5%	NA	NA	0.4%	4.3%

*Difference is significant at 90% level of significance.

**Difference is significant at 95% level of significance.

Note: The difference is the initiation rate in 2010 minus the initiation rate in 2000, so for U.S. Total it is given by $8.37\% - 8.44\%$, which equals -0.1% . The percent change in the initiation rate is measure of relative change that makes the difference a percent of the initial rate in 1990. The percent change in the U.S. Total is given by the expression $((8.37 - 8.44) \div 8.44) \times 100$, which equals -0.8% .

downturns of 8.2% and 7.2%, respectively. It is also noteworthy that the Mountain and Pacific regions stand out for the decline from 2000 to 2005, as shown in Table 2. In 2000 the initiation rate in these regions were 51% and 37% respectively, and they declined to 45% and 32%. These are the only two regions in which the change from 2000 to 2005 was significant. Changing demographics and rapid urbanization, particularly in the Mountain states, are likely contributors to the change.

Hunting initiation rate *percent changes* were substantially positive in two regions and negative in the rest (Table 3). The East North Central and West North Central experienced increases of 34.9% and 20.3%, respectively. The regions that experienced the largest declines were the

Middle Atlantic and West South Central regions. The West North Central region has historically had the highest percent of individuals 16 years of age or older who participate in hunting.⁷ The sharp regional divergence in hunting ignition rates is beyond the scope of this report, but it is an interesting question for further research.

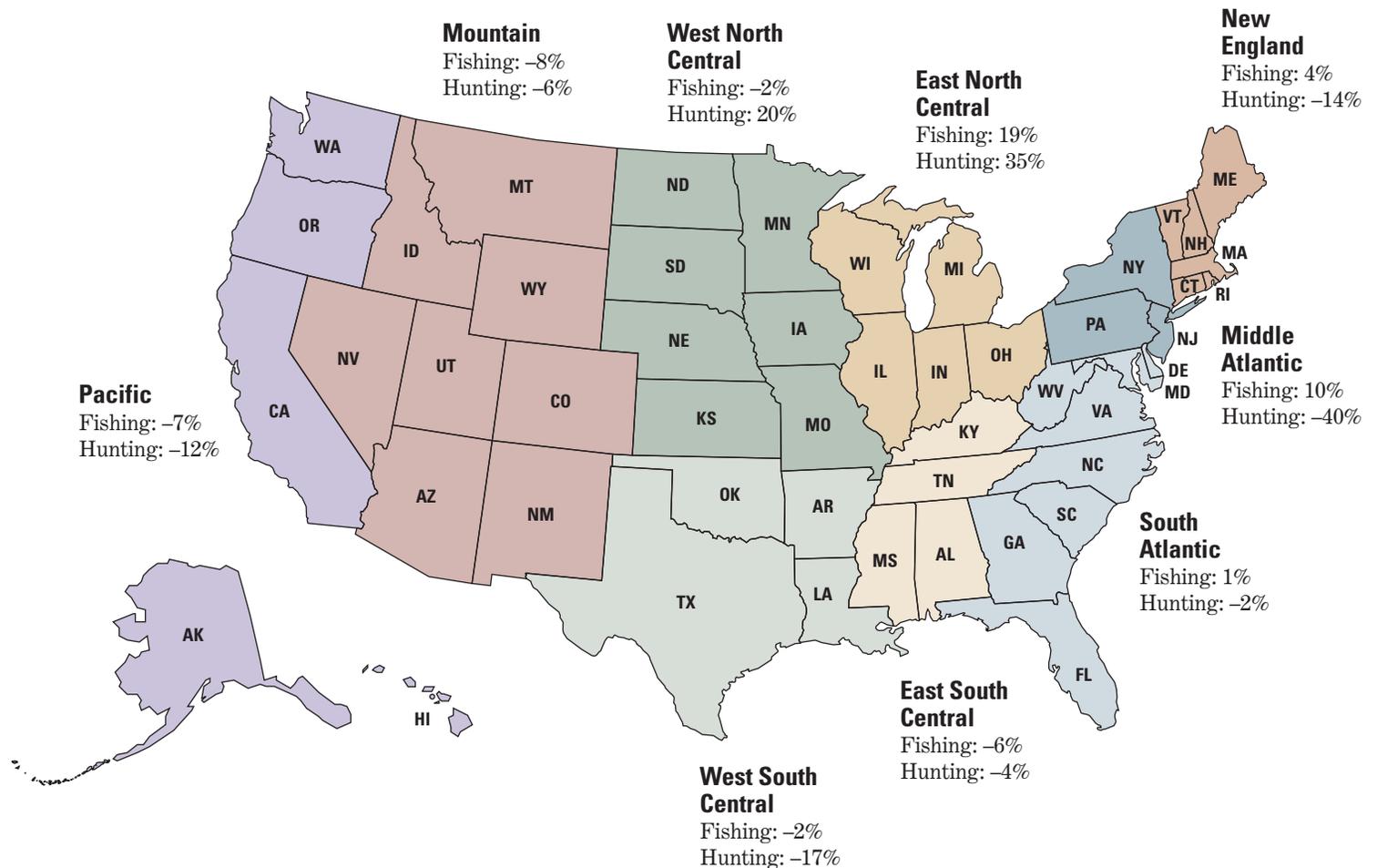
Fishing and hunting initiation both declined for urban residents and increased for rural residents from 2000 to 2010. However, for urban residents the results over the longer trend of 1990 to 2010 reveal a stabilizing trend for both fishing and hunting. For rural residents, initiation increased slightly from 2000 to

2010 for fishing and hunting, but over a longer period the results are reflective of a stabilizing trend.

Participation of males and females generally follow the pattern of relatively flat initiation from 2000 to 2010, except initiation of girls in hunting. While still substantially lower than boys, the initiation of girls at 3.8% is significantly higher than it was in 2000 (2.7%). For girls, the rate is on par with the level back in 1990, which is especially surprising when considering the decline in initiation of boys over the period: 20.3% to 12.4%. This difference is beyond this scope of this report, but is an interesting question for further research.

⁷ See FHWAR Survey reports from 2006 and 2001.

Chart 4. Fishing and Hunting Initiation Rates for Children Residing at Home by Geographic Region
Percent Change in Initiation Rates, 2000–2010



Participation of Children in 2010

Analysis of child participants in 2010 provides a different perspective on recruitment than the analysis of those who had ever participated. The primary advantage of considering 2010 activity alone is the ability to incorporate details about the wildlife related recreational activity of parents.⁸ This is accomplished by using a FHWAR household identification variable in conjunction with the variable that indicates the relationship of each member in the household to the person who owns, leases, or rents the residence. The analysis only includes households that indicated the presence of sons and daughters of the reference person.⁹

Table 4 shows the percent of sons and daughters living at home who fished in 2010. Daughters participated at lower rates than sons, and their participation rate falls more rapidly as age increases. For sons aged 6 to 9, 10 to 12, 13 to 19, and 20+, the percentages that participated were 26%, 34%, 30%, and 21% respectively. The comparable percentages for daughters were 22%, 26%, 14%, and 9%.

Tables 4 and 5 indicate an increased probability that both sons and daughters will participate in hunting and fishing if they also participated in wildlife watching. In accordance with the FHWAR, wildlife watching is defined as feeding, closely observing, or photographing wildlife. Table 4 indicates that 20% of sons and 10% of daughters who were not wildlife watchers participated in fishing, while 50% of sons

⁸ Here the term parent is used to designate reference persons and their spouses who had sons or daughters living in their households, which will not necessarily equate to the fathers and mothers of children living at home. There will be some adult males and females living in households with stepchildren. In its strictest sense, parent refers to fathers and mothers. However, a broader definition of parent is one of guardian. In this sense the reference person and his/her spouse who is not necessarily the father or mother can be considered a parent.

⁹ The approach of using only households that indicate the presence of children of the reference person is obviously not a perfect representation of the activities of parents and their children in the U.S. Surely, some households contain children that are not the son or daughter of the reference person, and they are excluded from this analysis due to the limitations inherent in the data.



and 35% of daughters who were wildlife watchers participated. Similarly, Table 5 indicates that 14.8% wildlife watching sons and 4.8% of daughters hunted compared to 5.5% and 1.5%, respectively, of those who did not wildlife watch.

Table 4 indicates that both sons and daughters whose parents participated in wildlife watching had higher participation rates in fishing. Twenty one percent of sons with male parents who either wildlife watched or did not wildlife watch in 2010 also fished. Among daughters with male parents who wildlife watched, 13% fished compared to 10% of those whose male parents did not wildlife watch. Similarly, 22% of sons and 13% of daughters fished if their female parent wildlife watched.

Table 5 indicates that children of wildlife-watching parents also had a higher participation rate in hunting. Sixteen percent of sons and 5.2% of daughters with male wildlife-watching parents also participated in hunting. These percentages compare to 5.4% and 1.7% of those with male parents who did not wildlife watch. Similarly, 12.9% of sons and 4.3% daughters hunted if their female parent wildlife watched.

Perhaps the most interesting information in Tables 4 and 5 is related to the fishing and hunting activity of parents. If a male parent did not participate in any fishing in 2010, the percentage of sons who participated was nearly one third the

U.S. total for any age son, which serves as an average. The percentage of sons who participated with male parents who did not participate at least one day was 10%, compared to the U.S. percentage of 28%. This indicates that if a boy's male parent did not fish at all, he was three times less likely to fish than the U.S. average. For daughters the discrepancy is even greater. Only five percent of daughters of any age participated in fishing when their male parents did not.

Table 5 indicates that activity on the part of the male parent likely has an even greater impact on the participation of children in hunting than fishing. Less than one half of one percent of daughters hunted if the male parent in the household did not. For sons, only 2.1% hunted if their male parent did not. The participation rate for sons whose male parents hunted 1–3 days is ten times the rate of those whose male parents did not. These results underscore the importance of the parental involvement in the initiation of children into hunting.

For most parental frequency levels, participation on the part of the female parent resulted in higher participation rates of both sons and daughters than the same level of activity on the part of the male parent. If a female parent fished 1 to 3 days 70% of daughters and 85% of sons participated. If a female parent fished more than 30 days 87% of daughters and 79% of sons participated. Similarly, if a female parent hunted 1–9 days, 29.7% of

Table 4. Percent of Sons and Daughters Living at Home who Fished in 2010 by Age Cohort and Recreation Activities of Parents

	Daughters					Sons				
	Any Age	6 to 9	10 to 12	13 to 19	20+	Any Age	6 to 9	10 to 12	13 to 19	20+
U.S. Total	17%	22%	26%	14%	9%	28%	26%	34%	30%	21%
Geographic Regions										
New England	15%	24%	30%	10%	*6%	27%	25%	31%	28%	22%
Middle Atlantic	12%	*13%	30%	10%	*5%	21%	24%	34%	22%	13%
East North Central	22%	29%	*35%	20%	*9%	37%	35%	50%	41%	23%
West North Central	31%	48%	42%	22%	*16%	43%	40%	53%	41%	37%
South Atlantic	16%	21%	22%	12%	13%	28%	27%	27%	34%	22%
East South Central	19%	*19%	*38%	*16%	**	38%	39%	*43%	39%	*31%
West South Central	14%	*18%	*15%	*12%	**	19%	*16%	*22%	16%	*25%
Mountain	22%	24%	25%	22%	17%	34%	27%	36%	41%	27%
Pacific	11%	15%	20%	9%	*4%	17%	17%	25%	17%	13%
Ethnicity										
Non-Hispanic	19%	26%	26%	17%	10%	29%	28%	38%	31%	22%
Hispanic	7%	*8%	*20%	*3%	*3%	19%	20%	15%	23%	14%
Race										
White	20%	26%	29%	17%	10%	33%	33%	41%	33%	25%
Black	6%	*11%	*12%	*2%	**	12%	*8%	*12%	14%	*12%
Asian	11%	*19%	**	**	**	8%	*10%	**	*13%	*6%
Other	11%	*13%	*19%	*9%	*7%	22%	*21%	*22%	31%	12%
Annual Household Income (2010 dollars)										
Under \$25,000	12%	14%	*18%	*9%	**	17%	12%	17%	24%	16%
\$25,000–\$39,999	11%	*14%	*18%	10%	*6%	22%	29%	24%	18%	22%
\$40,000–\$74,999	15%	20%	21%	12%	9%	27%	27%	40%	28%	18%
\$75,000–\$99,999	27%	28%	41%	25%	19%	45%	37%	43%	55%	35%
\$100,000 or More	25%	38%	33%	21%	11%	38%	36%	52%	37%	31%
Population Density										
Urban Area	14%	18%	25%	11%	7%	23%	22%	29%	24%	18%
Rural Area	25%	33%	28%	22%	15%	42%	39%	48%	46%	32%
Wildlife Watching Activities										
Not Watcher	10%	10%	18%	9%	6%	20%	19%	20%	21%	17%
Wildlife Watcher	35%	47%	37%	30%	21%	50%	43%	60%	55%	37%
Male Parent's Wildlife Watching										
Not Watcher	13%	14%	24%	12%	5%	21%	22%	24%	23%	13%
Wildlife Watcher	31%	44%	38%	26%	17%	47%	42%	61%	50%	36%
Female Parent's Wildlife Watching										
Not Watcher	10%	11%	20%	9%	5%	21%	19%	25%	24%	15%
Wildlife Watcher	30%	48%	36%	26%	15%	44%	44%	56%	47%	33%
Male Parent's Fishing, days										
None	5%	5%	10%	4%	3%	10%	10%	10%	12%	9%
1 to 3	45%	59%	44%	39%	*21%	71%	60%	76%	80%	48%
4 to 9	58%	59%	85%	50%	*35%	78%	81%	87%	90%	32%
10 to 19	59%	63%	53%	63%	*44%	87%	91%	97%	81%	73%
20 to 29	47%	*61%	*80%	37%	*26%	77%	*80%	*100%	71%	70%
30 or more	70%	82%	89%	60%	*52%	85%	80%	97%	77%	91%
Female Parent's Fishing, days										
None	9%	12%	16%	8%	5%	21%	19%	25%	24%	16%
1 to 3	70%	84%	93%	53%	*36%	85%	82%	95%	83%	79%
4 to 9	80%	93%	83%	71%	*74%	91%	88%	96%	94%	*83%
10 to 19	77%	99%	*87%	65%	**	96%	99%	97%	93%	*96%
20 to 29	84%	*61%	**	*87%	*88%	78%	*100%	*95%	*76%	*48%
30 or more	87%	76%	*99%	89%	*89%	79%	*60%	*100%	69%	*98%
Marital Status										
Married	19%	22%	29%	16%	9%	30%	28%	38%	32%	20%
Divorced	16%	*27%	25%	11%	13%	25%	19%	23%	28%	25%

*Estimate based on small sample size.

**Sample Size too small to report data reliably

Table 5. Percent of Sons and Daughters Living at Home who Hunted in 2010 by Age Cohort and Recreation Activities of Parents

	Daughters		Sons			
	Any Age	Any Age	6 to 12	13 to 19	20+	20+
U.S. Total	2.4%	8.0%	4.9%	11.1%	8.4%	21%
Geographic Regions						
New England	*0.5%	3.4%	*1.9%	4.1%	4.8%	22%
Middle Atlantic	*1.3%	2.5%	**	4.3%	2.6%	13%
East North Central	3.9%	10.9%	*7.4%	14.4%	10.8%	23%
West North Central	*5.9%	17.9%	10.5%	20.2%	29.3%	37%
South Atlantic	2.5%	7.2%	4.1%	10.8%	6.9%	22%
East South Central	*4.4%	18.5%	9.6%	29.1%	*19.9%	*31%
West South Central	*2.0%	10.3%	*8.4%	11.5%	*14.1%	*25%
Mountain	*1.7%	8.5%	*3.5%	14.3%	*8.7%	27%
Pacific	*1.0%	2.8%	*1.3%	3.9%	*3.6%	13%
Ethnicity						
Non-Hispanic	2.9%	9.5%	6.0%	13.3%	9.5%	22%
Hispanic	**	*0.9%	**	*1.2%	**	14%
Race						
White	3.0%	10.2%	6.3%	13.8%	11.4%	25%
Non-White	*0.8%	2.1%	*1.7%	3.3%	*1.2%	*12%
Annual Household Income (2010 dollars)						
Under \$25,000	*1.5%	3.4%	*1.0%	*7.0%	*4.0%	16%
\$25,000–\$39,999	*1.8%	*8.1%	2.6%	*11.4%	13.7%	22%
\$40,000–\$74,999	1.7%	7.7%	6.9%	8.8%	7.6%	18%
\$75,000–\$99,999	5.7%	16.0%	8.0%	24.0%	15.2%	35%
\$100,000 or More	2.4%	10.1%	8.0%	11.4%	11.6%	31%
Population Density						
Urban Area	1.1%	4.6%	2.3%	6.9%	5.0%	18%
Rural Area	6.1%	18.1%	12.4%	23.3%	20.4%	32%
Wildlife Watching Activities						
Not Watcher	1.5%	5.5%	2.6%	7.3%	7.0%	17%
Wildlife Watcher	4.8%	14.8%	9.9%	21.6%	14.8%	37%
Male Parent's Wildlife Watching						
Not Watcher	1.7%	5.4%	3.2%	7.3%	6.3%	13%
Wildlife Watcher	5.2%	15.8%	10.9%	21.5%	16.0%	36%
Female Parent's Wildlife Watching						
Not Watcher	1.3%	5.9%	3.9%	8.0%	6.4%	15%
Wildlife Watcher	4.3%	12.9%	8.3%	18.9%	11.9%	33%
Male Parent's Hunting, days						
None	*0.2%	2.1%	*0.6%	2.4%	4.6%	9%
1 to 3	**	22.8%	*16.4%	*23.0%	*30.6%	48%
4 to 9	*10.8%	56.1%	*39.7%	73.3%	*28.0%	32%
10 to 19	29.3%	54.7%	*50.4%	61.2%	52.4%	73%
20 to 29	*16.8%	54.5%	*34.5%	*58.3%	*86.4%	70%
30 or more	32.6%	65.6%	51.5%	88.3%	*69.1%	91%
Female Parent's Hunting, days						
None	*1.9%	7.3%	4.2%	10.2%	7.9%	16%
1 to 9	29.7%	71.4%	*57.7%	*77.8%	**	79%
10 to 19	*37.2%	72.6%	*74.4%	**	**	*83%
20 or more	**	*56.0%	**	*60.6%	**	*96%
Marital Status						
Married	2.8%	9.1%	6.3%	12.4%	8.9%	20%
Divorced	*2.0%	6.1%	*1.6%	10.7%	*4.9%	25%

*Estimate based on small sample size.

**Sample size too small to report data reliably.

daughters and 71.4% of sons participated. When female parents go, they are more likely to go with their children.¹⁰ This implies that male parents are more likely to engage in fishing and hunting without their children.

Table 6 reveals more information about the roles that female and male parents play in the introduction of children to fishing and hunting. It shows the percent of children who participated in fishing and hunting by parental participation. Thirteen percent of daughters living at home who fished in 2010 were from households without parental participation. Twenty two percent of sons who fished did not have parents who participated. Similarly, for hunting 8% of daughters and 21% of sons were from households without parental participation.

Table 6 also indicates that few child participants were from households where a female parent fished or hunted when a male parent did not. 15% of daughters and 9% of sons who fished were from households in which only a female parent participated. For hunting, only 2% of daughters and 4% of sons were from households in which only a female parent participated. In contrast, 32% of daughters and 38% of sons who fished, and 72% of daughters and 63% of sons who hunted, were from households in which only the male parent participated.

¹⁰ For several categories of parental frequency, activity on the part of the female parent does not result in significantly higher participation rate of children than the same frequency on the part of the male parent. There is no significant difference in hunting participation rate of sons and daughters whose female parents hunted 20 to 29 days than those whose male parents hunted 20 to 29 days. Sons are more likely to fish if their male parent fished 30 or more days than if their mother fished the same number of days. Sons whose female parent hunted 20 or more days were not significantly more likely to participate in fishing than those with fathers who hunted 20 or more days.

Also interesting is that the majority of daughters who fished had a female parent who participated. 40% were from households where both parents fished and 15% were from households where only the female parent participated. Taken together this indicates that 55% of all daughters who fished were from households with a female parent who fished. 40% of sons were from households in which a female parent participated. This likely indicates that activity of the female parent is more critical to the participation of daughters in fishing than sons.

Closer inspection of the relationship between male parent avidity and child participation reveals different pattern between hunting and fishing. Chart 5 reveals that even if the male parent only fished a few days, the participation rates of children increased dramatically. When a male parent in the household fished 1-3 days the participation rate of sons

increased from 10% to 71% and the rate for daughters from 5% to 45%. Although participation rates continue to climb as the male parent's fishing days increase up to 19 days, the changes between each level of participation are slight in comparison to the dramatic change that occurs between no participation and 1-3 days of participation. Some activity on the part of the male parent, even if slight, appears important to the participation of children. Alternatively, Chart 6 reveals that the participation rates of children in hunting are highly responsive to the participation frequency of male parents. Increased frequency of participation of the male parent was associated with steady and sizeable gains in the participation rates of children. When male parents participated 1-3 days, 10-19 days, and 30 or more days, the participation rate of sons climbed from 46% to 55% to 66%, and the participation rate for daughters climbed from 9% to 29% to 33%.

Table 6. Distribution of Sons and Daughters Living at Home Who Fished and Hunted in 2010 By Parents Fishing Activity

	<i>Fishing</i>		<i>Hunting</i>	
	<i>Daughters</i>	<i>Sons</i>	<i>Daughters</i>	<i>Sons</i>
Without parents who go	13%	22%	8%	21%
Male and female parents both go	40%	31%	18%	12%
Male parent goes female parent doesn't	32%	38%	72%	63%
Female parent goes male parent doesn't	15%	9%	2%	4%
Total	100%	100%	100%	100%



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A lingering question related to hunting and fishing among children is whether their parents' marital status affects participation. This issue can be analyzed using FHWAR data with some definitional limitations. In the context of the survey and this analysis, children are considered to be from divorced households if the parent with whom they live was divorced at the time of the survey. Those children from households with parents who were divorced prior to the survey but at the time of the survey lived with a parent who remarried are considered to be from married households. Children from divorced households are considered from single parent households at the time of the survey provided no other non-marital cohabitant is considered a parent. The survey did not determine if other unmarried cohabitants were present in the household.

Considering the definitional limitations described above, Tables 4 and 5 reveal that there are slight differences in participation rates of sons and daughters from married households and divorced households. However, none of these differences are statistically significant.¹¹

¹¹ At 90% confidence level.

Chart 5. Percent of Sons and Daughters Residing at Home who Participated in Fishing by Male Parents' Days of Fishing: 2010

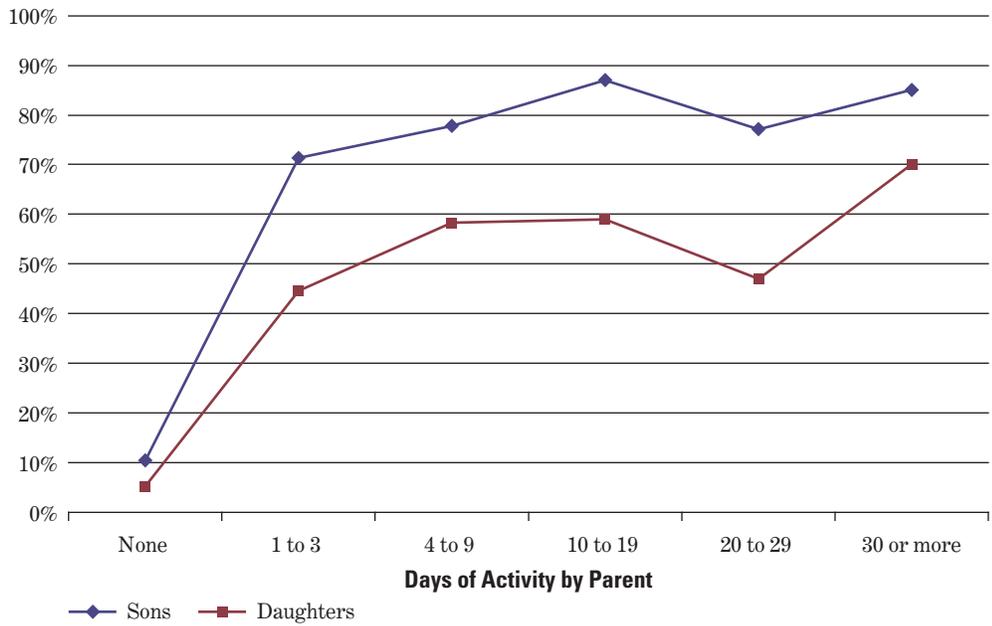
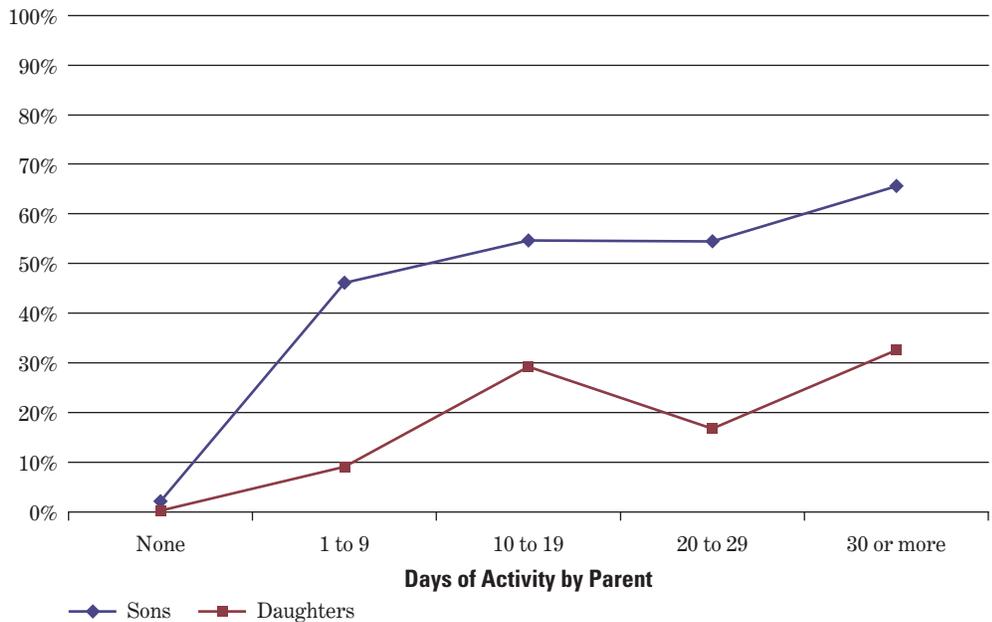


Chart 6. Percent of Sons and Daughters Residing at Home who Participated in Hunting by Male Parents' Days of Hunting: 2010



Retention

Having analyzed information available from the *FHWAR* concerning recruitment, it is now time to shift gears and see what information it contains about retention of individuals in fishing and hunting. As discussed above, individuals are no longer considered active anglers or hunters if they did not participate in the activity for three years prior to the *detail* survey years 1991, 1996, 2001, 2006, or 2011. Thus, individuals who participated in one or more of the three years prior to these survey years are considered active anglers or hunters. For example, for the 2011 *FHWAR*, an individual is considered a dropout from fishing if she had fished at some point in her life but did not participate in 2010, 2009, or 2008.

In this section “remained active” refers to participation in fishing or hunting in one of the three years prior to a survey. The “retention rate” is the percent of individuals who have participated in fishing or hunting at some point and have remained active in the respective activity.



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Age of Dropouts

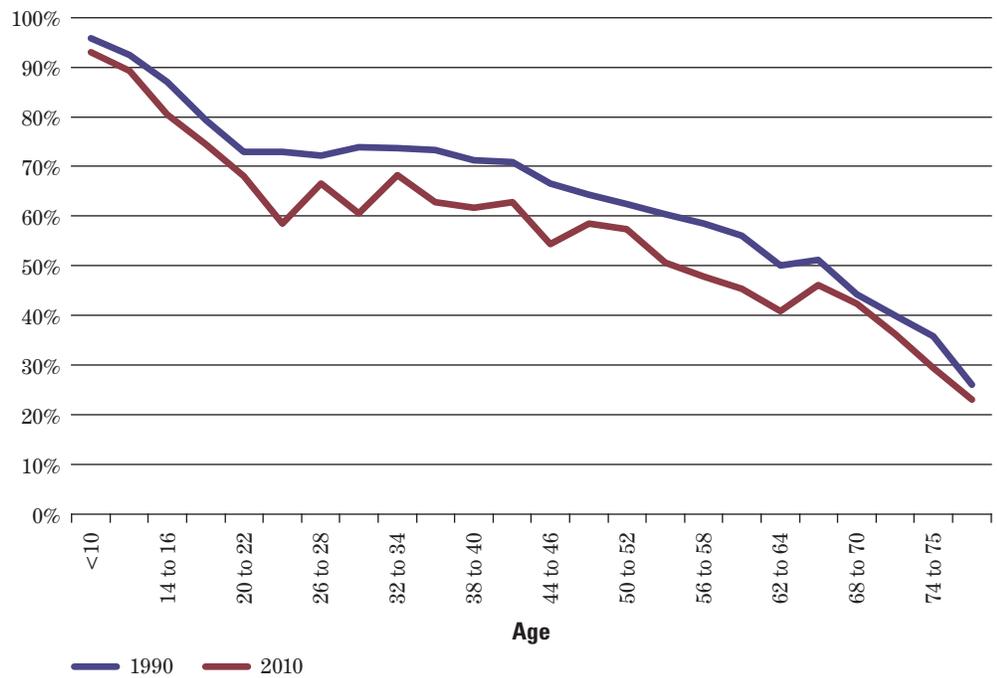
Information from the *FHWAR* is useful in discerning the percent of the population who previously participated in fishing and hunting and have remained active in at least one of three years prior to the survey year. These percentages can be calculated and graphed for individuals of different ages. These graphs serve as “dropout curves” that indicate ages where quitting is particularly acute. The dropout curves for fishing and hunting from the 1991 and 2011 *FHWARs* are displayed in Charts 7 and 8.

Fishing retention declines rapidly through the teenage years, levels out from the early twenties through the early forties, declines at a fairly constant rate from the early forties until the early sixties, and declines rapidly beyond the age of 68. From the early forties until 61, the retention rate, which is the percent active within the three prior years, decreases about three percent a year.

Hunting retention also decreases rapidly through the teenage years; but, unlike fishing, after the age of 25 the retention rate for hunting declines steadily until 75 years of age. This basic pattern was found in both 1990 and 2010. In 2010, the rate jumps around a bit, but the overall pattern is one of no level period for hunting retention.

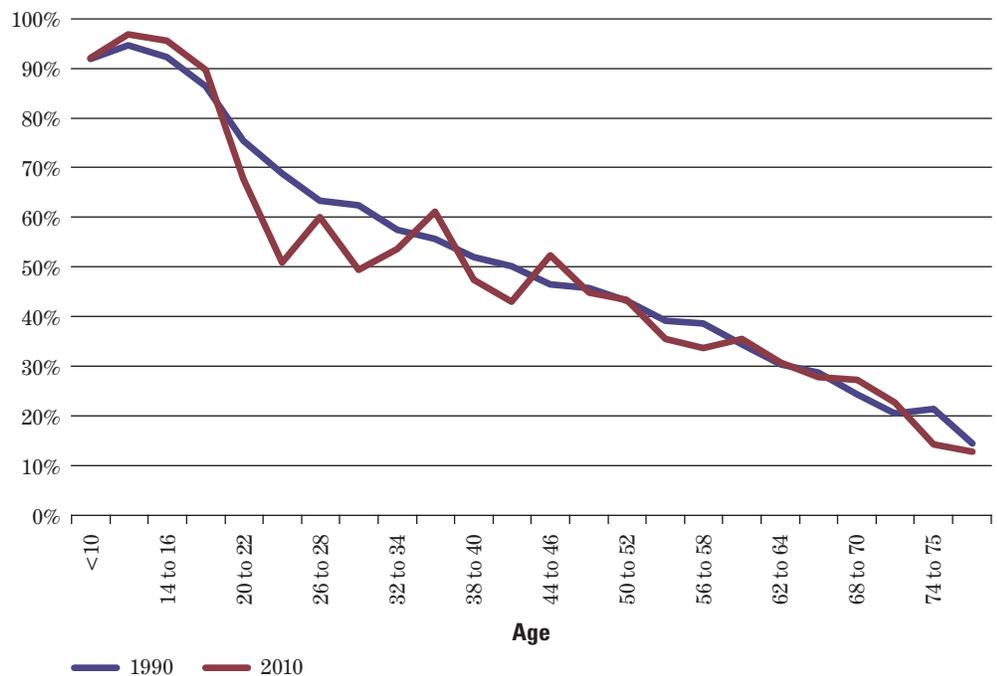
Comparing 1990 to 2010, the fishing retention rate decreased for all age individuals, illustrated in Chart 7 by the line for 2010 lying below that for 1990. For hunting, the retention rate declined for individuals 20 to 30 years old, but for the remaining hunters the retention rate is about the same.

Chart 7. Percent of Anglers Still Active* by Age: 1990 and 2010



*Individuals who have ever fished that participated in one of the three years prior to 1991 (so 1990, 1989, 1988) and 2011 surveys.

Chart 8. Percent of Hunters Still Active* by Age: 1990 and 2010



*Individuals who have ever fished that participated in one of the three years prior to 1991 (so 1990, 1989, 1988) and 2011 surveys.

Characteristics of Dropouts

Tables 7 and 8 present the retention rate by socioeconomic characteristics. Incorporating the socioeconomic information yields a better understanding of the “types” of individuals who are more likely to quit fishing or hunting. The discussion here focuses on changes in the retention rate for individuals of any age, but Tables A-3 and A-4 in the appendix can be used to analyze changes among different age cohorts.

In 2010 the retention rate for fishing among different geographic regions reveals that anglers in the West North Central and East South Central regions

had the highest retention rate at 60%¹². The West North Central region historically has the highest participation rate in fishing. The retention rate was lowest in the Pacific region¹³, which indicates that individuals who were exposed to fishing at some point were more likely to quit fishing in the Pacific region than in other regions of the U.S.

¹² The retention rates in these regions are not statistically different than those reported for West South Central, Mountain and East North Central.

¹³ The retention rate is significantly lower (90% level) in the Pacific than all other regions.

Perhaps not surprising, females had a lower retention rate than males, and urban residents had a lower retention rate than rural residents. Among females of any age, 48% remained active in 2010, which compares to 59% of males. 51% of urban residents remained active compared to 64% of rural residents.

Some results are probably less expected, such as those for ethnicity and income. The fishing retention rate is similar for all income levels, but it is highest for those with incomes of \$40,000–\$99,999. It is noteworthy that Non-Hispanics have a lower retention rate than Hispanics. In 2010 the retention rate was 60% for

Table 7. Fishing Retention Rates by Selected Characteristics: 1995, 2000, 2005, and 2010
(Population 16 Years of Age and Older)

	2010	2005	2000	1995	1990	Difference 2000–2010	Percent Change 2000–2010
U.S. Total	55%	57%	60%	61%	65%	**–4.6%	–7.7%
Geographic Regions							
New England	50%	54%	56%	59%	62%	**–6.5%	–11.5%
Middle Atlantic	55%	54%	57%	59%	62%	–2.0%	–3.5%
East North Central	57%	60%	60%	63%	65%	–2.3%	–3.9%
West North Central	60%	63%	66%	66%	67%	**–5.7%	–8.7%
South Atlantic	55%	59%	63%	62%	69%	**–8.0%	–12.8%
East South Central	60%	61%	65%	65%	70%	*–4.7%	–7.3%
West South Central	56%	61%	61%	64%	70%	–4.7%	–7.7%
Mountain	57%	53%	58%	60%	64%	–0.6%	–1.0%
Pacific	46%	49%	52%	53%	60%	**–6.0%	–11.6%
Gender							
Male	59%	62%	65%	67%	71%	**–5.4%	–8.4%
Female	48%	49%	51%	52%	57%	**–3.4%	–6.6%
Ethnicity							
Non-Hispanic	55%	57%	59%	61%	65%	**–4.6%	–7.8%
Hispanic	60%	58%	66%	65%	70%	*–6.4%	–9.6%
Race							
White	55%	58%	60%	61%	66%	**–5.3%	–8.8%
Black	53%	52%	53%	57%	61%	0.3%	0.5%
Other	58%	55%	58%	62%	67%	–0.4%	–0.7%
Population Density							
Urban Area	51%	54%	56%	58%	62%	**–5.0%	–8.9%
Rural Area	64%	66%	67%	67%	72%	**–3.5%	–5.1%
Annual Household Income (2010 dollars)							
Under \$25,000	53%	NA	48%	NA	NA	**5.3%	11.0%
\$25,000–\$39,999	54%	NA	56%	NA	NA	–1.9%	–3.5%
\$40,000–\$99,999	59%	NA	64%	NA	NA	**–5.6%	–8.8%
\$100,000 or More	58%	NA	64%	NA	NA	**–6.0%	–9.4%

* Difference is significant at 90% level.

** Difference is significant at 95% level.

Note: Retention rates for fishing are calculated as the percent who have ever participated in fishing who were active in at least one of the three years prior to 1996 (so 1995, 1994, 1993), 2001, 2006, or 2011 Surveys. The difference is the retention rate in 2010 minus the retention rate in 2000, so for all the U.S. the difference in retention in fishing is given by 54.9% – 59.5%, which equals –4.6%. The percent change in the retention rate is measure of relative change that makes the difference a percent of the rate in 2000. The percent change in the all the U.S. from fishing is given by the expression $((0.549 - 0.595) \div 0.595) \times 100$, which equals –7.7%.

Hispanics and 55% for Non-Hispanics. In 2000 the retention rate was higher for Hispanics at 66%, which compared to 59% for Non-Hispanics¹⁴, and in 2005 the rates were about the same for both. These data support a conclusion that lower participation rates among Hispanics are more likely the result of lower recruitment rates.

Table 8 presents hunting retention rates. Among different geographic regions, the East South Central had the highest

¹⁴ The retention rate of Hispanics is significantly higher at 90% level than Non-Hispanics for both 2000 and 2010.

retention¹⁵. Similar to fishing, the Pacific region had the lowest hunting retention rate. However, the difference between the retention rates among the Pacific and other regions is greater for hunting than for fishing.

There are some similarities and some differences when retention rates of hunters are compared to those of anglers. Like anglers, hunters with incomes under \$25,000 had the lowest retention rate.

¹⁵ The retention rate in the East South Central Region is significantly higher at 90% level than four other areas: New England, South Atlantic, Mountain, and Pacific.

However, unlike anglers the highest retention rate among hunters occurs among individuals with incomes of \$100,000 or more¹⁶.

Not surprisingly, residents of urban areas had lower hunting retention rates than those in rural areas¹⁷. This suggests that the higher participation rate for hunting in rural areas is not only due to higher recruitment but also to higher retention.

¹⁶ The rate among those with incomes over \$100,000 is only significantly different from those with Under \$25,000.

¹⁷ Urban residents are significantly lower at 95% level.

Table 8. Hunting Retention Rates by Selected Characteristics: 1990, 1995, 2000, 2005, and 2010
(Population 16 Years of Age and Older)

	2010	2005	2000	1995	1990	Difference 2000–2010	Percent Change 2000–2010
U.S. Total	42.3%	42.5%	43.4%	45%	49%	-1.1%	-2.5%
Geographic Regions							
New England	37%	38%	41%	45%	46%	-4.1%	-10.0%
Middle Atlantic	46%	47%	49%	50%	54%	-2.5%	-5.1%
East North Central	47%	47%	47%	49%	50%	-0.5%	-1.1%
West North Central	47%	50%	51%	53%	52%	-4.4%	-8.5%
South Atlantic	38%	40%	40%	40%	48%	-2.0%	-5.0%
East South Central	48%	46%	48%	51%	55%	0.5%	1.0%
West South Central	47%	47%	46%	49%	54%	0.9%	1.9%
Mountain	39%	36%	42%	45%	50%	-2.7%	-6.5%
Pacific	29%	27%	28%	33%	36%	1.4%	5.1%
Gender							
Male	44%	44%	46%	48%	51%	-1.9%	-4.2%
Female	36%	33%	32%	33%	38%	3.9%	12.3%
Ethnicity							
Non-Hispanic	43%	42%	43%	45%	49%	-0.9%	-2.2%
Hispanic	39%	45%	43%	44%	53%	-4.3%	-10.0%
Race							
White	43%	43%	44%	46%	50%	-1.4%	-3.1%
Non-White	39%	33%	33%	39%	41%	6.2%	18.7%
Population Density							
Urban Area	36%	35%	36%	39%	43%	-0.7%	-1.9%
Rural Area	52%	53%	53%	54%	59%	-1.5%	-2.8%
Annual Household Income (2010 dollars)							
Under \$25,000	34%	NA	31%	NA	NA	2.4%	7.6%
\$25,000–\$39,999	43%	NA	41%	NA	NA	1.9%	4.7%
\$40,000–\$99,999	46%	NA	47%	NA	NA	-1.5%	-3.1%
\$100,000 or More	49%	NA	46%	NA	NA	2.2%	4.7%

Note: Retention rates for hunting are calculated as the percent who have ever participated in hunting who were active in at least one of the three years prior to 1996 (so 1995, 1994, 1993), 2001, 2006, or 2011 Surveys. The difference is the retention rate in 2010 minus the retention rate in 2000, so for all the U.S. the difference in retention in hunting is given by 42.3% – 43.4%, which equals -1.1%. The percent change in the retention rate is measure of relative change that makes the difference a percent of the rate in 2000. The percent change in the all the U.S. from fishing is given by the expression $((0.423 - 0.434) \div 0.434) \times 100$, which equals -2.5%.

Trend in Retention

The trend in fishing and hunting retention can be analyzed in detail by examining the relationship between changes in the retention rate over time and socioeconomic information. Again, the concept of a *percent change* in the retention rate is also useful in discerning trends. As discussed for recruitment, much of the trend discussion focuses on changes in the point estimates, so they should be used with this in mind.

The difference in the retention rates between any two survey years can also be useful. For example, the differences can be used to approximate, with some qualifications, the total number of additional active anglers and hunters there would have been in 2010 if the retention rate had remained unchanged from 2000 to 2010. Generally, the *screen* data is considered more reliable for percentage estimates than for participation levels because of the potential for bias associated with recall of more than one year of activity, which is required for screen interviews but not for detail interviews. Consequently, participation numbers should be viewed as ballpark estimates only; additional research would be required to refine these approximations.

For fishing, Table 7 indicates that the retention rate for individuals 16 years and older in 2010 was 4.6% lower than in 2000. Data from the *screen* survey indicates that in 2010, 124 million individuals 16 and over had at some point in their lives participated in fishing. Of this 110 million, 59 million are considered active anglers because they participated from 2008–2010. If 4.6% more of those who had ever participated remained active sometime in 2008–2010, then the number of active anglers in 2010 could have been as high as 65.3 million. If the retention rate for hunting had not decreased, the number of individuals considered active hunters could have been 20.1 million instead of 19.7 million. This does not mean that 65.3 million people will fish or 20.1 million will hunt in the *detail phase* survey year of 2011, since persons considered active for purposes of this report were only required to participate in one of the three prior years. The number of people considered active anglers and hunters will, realistically, always be higher than the number who actually hunt or fish in a single specific year.



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The *percent changes* in retention rates for fishing and hunting that occurred from 2000 to 2010 are shown in Tables 7 and 8. These *percent changes* reveal several interesting details about which groups of individuals have experienced the least decrease or highest increase in fishing and hunting retention.

Those with lower incomes experienced an increase in fishing retention, while other income levels experienced a decline. The *percent changes* column in Table 7 indicates that there was an increase in retention among those with incomes of \$25,000 or less. The highest decline in retention was among those with incomes of \$100,000 or more.

There are other interesting results with respect to fishing retention. Fishing retention declined the most in the South Atlantic region. The retention rate declined more among residents of urban areas than rural areas.

Like fishing, those with lower incomes experienced the relatively sharpest increase in the hunting retention rate. Different from fishing, however, was that the anglers with the highest income also had an increase in retention. The change in the hunting retention rate among those with incomes of \$40,000 to \$99,999 was the only income category that did not see an increase in retention.

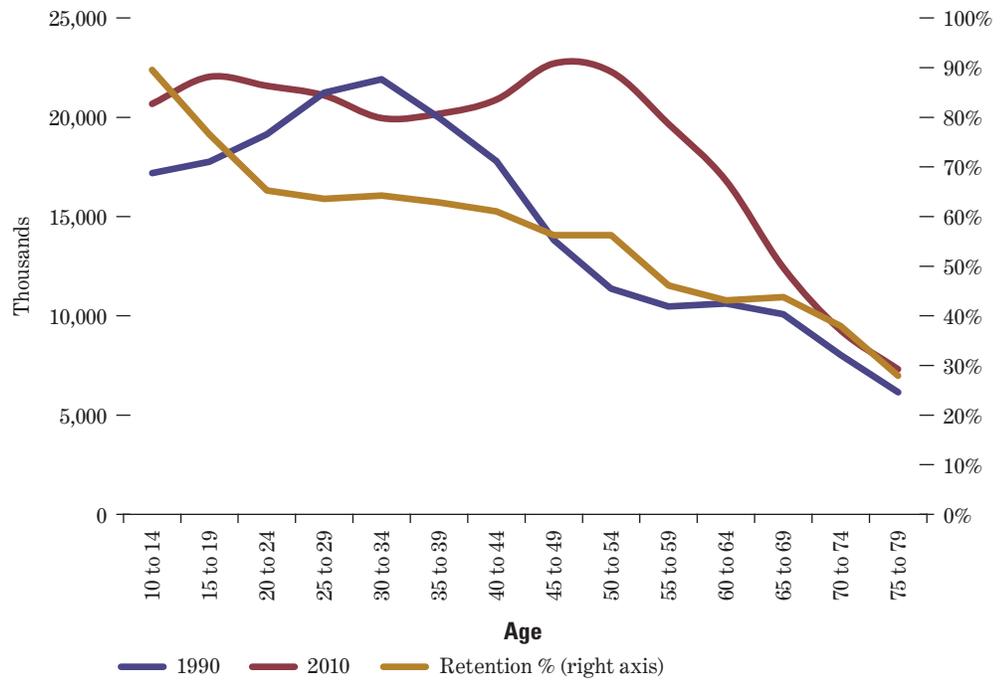
The overall decrease in hunting retention rates was sharpest in the New England states. Unlike fishing, there were regions that did not experience declines in retention. The Pacific, East South Central, and West South Central all had an increase in retention.¹⁸

¹⁸ As noted in the tables the changes were not statistically significant.

Demographic Effect on Fishing Retention

The aging of the U.S. population will likely continue to put downward pressure on the fishing retention rate. This is evidenced in Chart 9, which overlays the age distribution of the U.S. population with the 2010 retention rate curve for fishing. The chart indicates that back in 1990 the baby boomer population were roughly between the ages of 25–45, which is the relatively flat section on the retention curve. In the 20 years between 1990 and 2010, the baby boomer population has shifted out to 45–65, and the peak of the bubble is right at 50 years old in 2010. The retention curve indicates that 50 years old is the age at which the continued participation in fishing declines at a considerably faster rate. This demographic effect is a likely contributor to the overall decline in fishing retention over the last 10 years. Additionally, even if the retention curve does not change in the future within age categories, the overall retention rate in the U.S. is likely to fall because a large segment of the population is entering a stage in life in which participation diminishes.

Chart 9. U.S. Population in 1990 and 2010 and Fishing Retention Percentage



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Summary

Throughout the decade of the 1990s and up until about 2006 there was a downturn in fishing and hunting participation that concerned many natural resource managers and organizations interested in the future of these activities. Data from the 1991, 1996, 2001, and 2006 *National Surveys of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR)* revealed that the declines in participation were attributable to both declining recruitment and retention. Then, the 2011 FHWAR found an increase in fishing and hunting, back to levels comparable with the 2001 results.

Using data primarily from the *screen* phase of the FHWAR, this report examines trend in recruitment and retention in both hunting and fishing over a twenty year period from 1990 to 2010. The data paint a picture of stabilizing recruitment and retention through the 2000s when compared to the 1990s. Through the nineties recruitment and retention for both hunting and fishing were declining relatively quickly. While there have been some exceptions for various population cohorts, the overall message is one of stabilization from 2005 to 2010. Based on feedback on the prior version of this report, the authors were made aware of accelerated efforts to improve recruitment and retention in fishing and hunting public agencies and private organizations. The FHWAR was not designed to ascertain the impact that these programs have had in recent years. Nevertheless, it is at least encouraging that the pace of decline in recruitment and retention that occurred throughout the 1990s did not continue over the period 2000 to 2005, and actually increased for some population cohorts from 2005 to 2010.

The notable exception to the overall stabilizing trend is that for retention in fishing. While fishing recruitment has not declined from the time of the last report, fishing retention has declined. A contributor to the decline in fishing retention is baby boomer population



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that is now situated at ages of 50 and above. As the peak of the baby boomers goes beyond 50 years of age, the demographic effect, taken alone, will likely continue to put downward pressure on fishing retention.

FHWAR data offer some clues that may be useful in improving overall recruitment and retention. Fishing and hunting are familial activities, with children's activities heavily influenced by the participation of parents within the household. If retention of parents in fishing and hunting can be improved, it is likely that initiation of children can also be improved.

While the survey data reveal that adolescence is an important time for recruitment, it also indicates that young and middle-aged adults also provide a substantial number of new recruits.

At least a third of first time anglers as well as hunters were over 20 years old. While this finding may be surprising, it is also encouraging that new recruits into hunting and fishing are not limited to children.

For the U.S. as a whole, evidence from the FHWAR indicates that the rapid pace of decline in recruitment and retention has diminished. However, the demographic change of an aging population will likely put continued downward pressure on retention. This has already started for fishing, and the trend will likely continue, as the population surge of baby boomers moves past 50 years of age. If recruitment does not increase, it will likely not offset the entire effect that the aging of the population will have on fishing participation.

Appendix



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Table A-1. Percent of Sons and Daughters Residing at Home Who Have Ever Participated in Fishing by Age Cohort

	2010					2005					2000					1995				
	Any Age	6-9	10-12	13-19	20+	Any Age	6-9	10-12	13-19	20+	Any Age	6-9	10-12	13-19	20+	Any Age	6-9	10-12	13-19	20+
U.S. Total	43%	37%	48%	45%	40%	42%	39%	46%	46%	36%	42%	38%	46%	46%	34%	50%	45%	55%	53%	45%
Geographic Regions																				
New England	41%	37%	48%	43%	39%	41%	37%	43%	45%	36%	40%	39%	49%	40%	32%	51%	45%	59%	54%	47%
Middle Atlantic	36%	35%	43%	38%	30%	34%	32%	38%	38%	29%	33%	29%	39%	37%	26%	43%	40%	51%	45%	38%
East North Central	54%	47%	61%	56%	50%	47%	47%	52%	49%	40%	45%	40%	50%	51%	35%	50%	47%	58%	52%	44%
West North Central	59%	61%	64%	57%	55%	61%	61%	67%	62%	49%	60%	55%	69%	61%	53%	65%	67%	69%	67%	52%
South Atlantic	40%	37%	42%	44%	38%	41%	38%	47%	44%	35%	40%	38%	43%	43%	33%	49%	44%	53%	52%	45%
East South Central	45%	37%	57%	45%	48%	51%	46%	52%	57%	43%	48%	41%	53%	53%	44%	50%	43%	54%	55%	47%
West South Central	39%	31%	47%	44%	34%	45%	37%	48%	49%	44%	40%	39%	40%	45%	34%	53%	45%	59%	55%	50%
Mountain	47%	39%	47%	56%	42%	45%	39%	51%	50%	37%	51%	40%	53%	58%	50%	59%	52%	62%	62%	57%
Pacific	35%	25%	38%	36%	39%	32%	27%	33%	38%	28%	37%	33%	39%	43%	31%	43%	35%	47%	47%	42%
Gender																				
Male	50%	43%	52%	55%	48%	49%	46%	52%	53%	44%	50%	43%	54%	55%	44%	59%	51%	63%	65%	57%
Female	34%	32%	43%	35%	28%	35%	32%	39%	39%	26%	33%	32%	37%	36%	23%	39%	38%	47%	41%	29%
Ethnicity																				
Non-Hispanic	46%	41%	50%	50%	43%	46%	44%	51%	50%	39%	45%	41%	50%	49%	36%	53%	48%	59%	56%	46%
Hispanic	26%	22%	35%	26%	23%	22%	17%	25%	24%	22%	24%	21%	25%	28%	21%	26%	21%	25%	26%	30%
Race																				
White	49%	44%	55%	51%	46%	47%	43%	50%	51%	41%	46%	42%	51%	50%	38%	55%	50%	62%	59%	50%
Black	21%	19%	23%	23%	19%	23%	21%	25%	25%	19%	20%	14%	21%	24%	18%	23%	23%	22%	22%	25%
Asian	21%	22%	17%	21%	23%	19%	18%	25%	21%	14%	23%	24%	26%	26%	17%	31%	24%	35%	36%	26%
Other	32%	27%	32%	40%	29%	59%	55%	62%	64%	50%	37%	29%	27%	48%	36%	32%	24%	35%	35%	36%
Annual Household Income (2005 dollars)																				
Under \$25,000	29%	24%	38%	30%	27%	NA	NA	NA	NA	NA	27%	21%	31%	33%	25%	NA	NA	NA	NA	NA
\$25,000-\$39,999	31%	26%	31%	33%	31%	NA	NA	NA	NA	NA	35%	28%	41%	40%	29%	NA	NA	NA	NA	NA
\$40,000-\$99,999	36%	33%	39%	36%	35%	NA	NA	NA	NA	NA	49%	46%	51%	53%	43%	NA	NA	NA	NA	NA
\$100,000 or More	49%	43%	56%	52%	44%	NA	NA	NA	NA	NA	55%	52%	61%	57%	48%	NA	NA	NA	NA	NA
Population Density																				
Urban Area	38%	32%	42%	41%	37%	38%	35%	42%	41%	32%	38%	34%	42%	42%	31%	45%	41%	50%	48%	42%
Rural Area	56%	51%	65%	59%	49%	56%	52%	57%	60%	51%	52%	48%	55%	56%	46%	60%	56%	68%	62%	51%

Table A-2. Percent of Sons and Daughters Residing at Home Who Have Ever Participated in Hunting by Age Cohort

	2010			2005			2000			1995						
	Any Age	6-12	13-19	20+	Any Age	6-12	13-19	20+	Any Age	6-12	13-19	20+				
U.S. Total	8%	4.5%	10.5%	11.9%	8.1%	4.0%	11.2%	10.9%	8%	4%	12%	13%	10%	4%	14%	16%
Geographic Regions																
New England	4%	2%	4%	7%	3%	1%	5%	5%	5%	2%	5%	8%	5%	1%	5%	11%
Middle Atlantic	4%	1%	5%	5%	6%	1%	8%	10%	6%	2%	9%	8%	7%	1%	12%	11%
East North Central	12%	6%	15%	14%	8%	3%	12%	13%	9%	3%	13%	14%	9%	3%	12%	16%
West North Central	18%	10%	20%	34%	15%	6%	23%	18%	15%	7%	23%	21%	18%	6%	26%	34%
South Atlantic	8%	3%	10%	10%	8%	5%	9%	11%	8%	3%	11%	12%	10%	3%	12%	18%
East South Central	15%	8%	20%	25%	16%	11%	20%	17%	16%	8%	21%	25%	16%	7%	22%	24%
West South Central	9%	6%	10%	17%	11%	7%	16%	12%	11%	7%	14%	15%	14%	8%	19%	18%
Mountain	10%	6%	13%	16%	9%	4%	11%	16%	11%	3%	16%	24%	13%	3%	18%	27%
Pacific	4%	2%	5%	6%	4%	2%	6%	5%	4%	2%	6%	8%	5%	2%	7%	9%
Gender																
Male	12%	6%	16%	17%	13%	6%	17%	17%	14%	6%	19%	21%	17%	6%	23%	27%
Female	4%	2%	5%	5%	3%	2%	5%	4%	3%	2%	4%	3%	3%	1%	4%	3%
Ethnicity																
Non-Hispanic	10%	5%	13%	13%	9%	5%	13%	12%	9%	4%	13%	14%	11%	4%	15%	17%
Hispanic	1%	1%	1%	3%	3%	1%	4%	4%	3%	1%	4%	5%	3%	2%	3%	7%
Race																
White	11%	6%	13%	15%	10%	5%	13%	13%	10%	4%	14%	15%	12%	4%	16%	19%
Non-White	2%	1%	3%	4%	2%	1%	3%	4%	2%	0%	3%	3%	4%	2%	4%	6%
Annual Household Income (2005 dollars)																
Under \$25,000	6%	2%	7%	13%	NA	NA	NA	NA	5%	3%	7%	9%	NA	NA	NA	NA
\$25,000-\$39,999	8%	3%	9%	13%	NA	NA	NA	NA	8%	2%	13%	14%	NA	NA	NA	NA
\$40,000-\$99,999	10%	6%	14%	12%	NA	NA	NA	NA	10%	5%	15%	17%	NA	NA	NA	NA
\$100,000 or More	10%	6%	11%	15%	NA	NA	NA	NA	9%	4%	12%	16%	NA	NA	NA	NA
Population Density																
Urban Area	5%	2%	7%	7%	5%	2%	7%	7%	5%	2%	7%	9%	7%	2%	9%	12%
Rural Area	18%	11%	22%	27%	19%	10%	25%	25%	17%	8%	23%	25%	18%	7%	24%	29%

Table A-3. Retention Rate* of Hunters by Age and Selected Characteristics: 1995, 2000, 2005, 2010

	2010					2005					2000					1995													
	Any Age	16-24	25-34	35-44	45-54	55-64	65+	Any Age	16-24	25-34	35-44	45-54	55-64	65+	Any Age	16-24	25-34	35-44	45-54	55-64	65+								
U.S. Total	42%	74%	54%	49%	45%	34%	21%	43%	74%	55%	50%	43%	33%	20%	43%	76%	59%	53%	39%	31%	18%	45%	79%	60%	51%	43%	33%	20%	
Geographic Regions																													
New England	37%	88%	42%	47%	35%	29%	18%	38%	73%	46%	46%	42%	32%	16%	41%	82%	57%	50%	38%	29%	20%	45%	83%	62%	50%	42%	35%	22%	
Middle Atlantic	46%	81%	69%	48%	51%	44%	22%	47%	71%	61%	59%	48%	36%	25%	49%	82%	61%	60%	41%	39%	26%	50%	88%	57%	58%	47%	39%	21%	
East North Central	47%	82%	59%	50%	52%	40%	17%	47%	76%	63%	54%	51%	35%	22%	47%	85%	66%	60%	41%	31%	20%	49%	81%	63%	56%	45%	32%	20%	
West North Central	47%	73%	70%	55%	48%	33%	23%	50%	76%	64%	56%	54%	39%	24%	51%	84%	71%	62%	47%	37%	21%	53%	84%	71%	59%	48%	38%	25%	
South Atlantic	38%	77%	47%	44%	36%	30%	19%	40%	74%	54%	47%	37%	32%	16%	40%	69%	55%	49%	37%	30%	17%	40%	75%	53%	44%	39%	31%	16%	
East South Central	48%	74%	49%	70%	45%	35%	24%	46%	76%	59%	58%	45%	34%	22%	48%	84%	66%	52%	43%	32%	18%	51%	81%	65%	56%	44%	34%	25%	
West South Central	47%	72%	60%	51%	48%	39%	28%	47%	80%	53%	57%	43%	39%	25%	46%	78%	56%	50%	46%	34%	20%	49%	72%	66%	54%	46%	34%	24%	
Mountain	39%	67%	44%	44%	45%	31%	19%	36%	62%	50%	40%	38%	26%	16%	42%	70%	53%	47%	44%	30%	16%	45%	79%	56%	46%	42%	38%	21%	
Pacific	29%	57%	42%	37%	32%	20%	16%	27%	64%	40%	32%	27%	23%	10%	28%	51%	43%	42%	23%	19%	11%	33%	67%	45%	36%	35%	28%	12%	
Gender																													
Male	44%	75%	55%	52%	46%	36%	22%	44%	74%	58%	53%	45%	35%	22%	46%	78%	62%	55%	42%	34%	20%	48%	81%	62%	53%	45%	35%	21%	
Female	36%	72%	47%	38%	37%	20%	14%	33%	72%	43%	39%	31%	22%	8%	32%	65%	44%	41%	28%	16%	11%	33%	63%	46%	37%	28%	24%	13%	
Ethnicity																													
Non-Hispanic	43%	75%	54%	50%	45%	34%	21%	42%	74%	56%	50%	43%	33%	20%	43%	77%	59%	53%	40%	31%	19%	45%	79%	60%	51%	43%	34%	20%	
Hispanic	39%	62%	49%	34%	28%	32%	24%	45%	61%	53%	48%	44%	40%	15%	43%	64%	44%	52%	36%	25%	8%	44%	72%	55%	45%	33%	33%	25%	
Race																													
White	43%	75%	53%	51%	45%	33%	21%	43%	74%	57%	51%	44%	33%	20%	44%	77%	59%	54%	40%	32%	19%	46%	79%	61%	51%	43%	34%	20%	
Non-White	39%	73%	57%	33%	37%	38%	14%	33%	66%	40%	43%	28%	28%	17%	33%	61%	50%	38%	29%	22%	14%	39%	78%	49%	42%	37%	25%	14%	
Annual Household Income (2010 dollars)																													
Under \$25,000	34%	64%	42%	39%	34%	24%	16%	NA	NA	NA	NA	NA	NA	NA	31%	72%	55%	42%	25%	25%	15%	NA							
\$25,000-\$39,999	43%	69%	53%	60%	36%	40%	20%	NA	NA	NA	NA	NA	NA	NA	41%	71%	58%	52%	37%	32%	20%	NA							
\$40,000-\$99,999	46%	80%	56%	49%	49%	37%	23%	NA	NA	NA	NA	NA	NA	NA	47%	79%	57%	55%	43%	33%	19%	NA							
\$100,000 or More	49%	88%	58%	54%	52%	35%	23%	NA	NA	NA	NA	NA	NA	NA	46%	82%	59%	51%	40%	32%	26%	NA							
Population Density																													
Urban Area	36%	66%	43%	42%	38%	28%	17%	35%	65%	47%	42%	36%	26%	14%	36%	68%	52%	45%	32%	22%	14%	39%	73%	54%	41%	37%	28%	16%	
Rural Area	52%	85%	70%	60%	54%	41%	26%	53%	84%	70%	62%	53%	43%	28%	53%	87%	69%	63%	49%	42%	26%	54%	85%	71%	63%	50%	41%	25%	

Note: Retention Rate is the percent of individuals who have ever hunted that participated in the three years prior to 1996 (so 1995, 1994, 1993), 2001, 2006, or 2011 Surveys

Table A-4. Retention Rate* of Anglers by Age and Selected Characteristics: 1995, 2000, 2005, 2010

	2010					2005					2000					1995												
	Any Age	16-24	25-34	35-44	45-54	55-64	65+	Any Age	16-24	25-34	35-44	45-54	55-64	65+	Any Age	16-24	25-34	35-44	45-54	55-64	65+							
U.S. Total	55%	70%	64%	62%	56%	45%	35%	57%	69%	65%	67%	58%	50%	33%	60%	73%	69%	69%	58%	51%	35%	61%	73%	71%	69%	59%	51%	36%
Geographic Regions																												
New England	50%	67%	59%	54%	50%	42%	34%	54%	65%	61%	62%	56%	45%	27%	56%	71%	62%	66%	59%	47%	30%	59%	71%	68%	68%	55%	45%	35%
Middle Atlantic	55%	63%	57%	61%	64%	48%	31%	54%	64%	63%	66%	52%	44%	31%	57%	74%	67%	64%	54%	51%	30%	59%	73%	66%	69%	57%	46%	31%
East North Central	57%	76%	65%	60%	65%	42%	36%	60%	74%	67%	68%	60%	53%	34%	60%	79%	70%	68%	57%	51%	37%	63%	71%	72%	71%	61%	52%	37%
West North Central	60%	74%	62%	63%	63%	63%	37%	63%	75%	70%	73%	65%	59%	38%	66%	81%	78%	78%	62%	53%	41%	66%	75%	73%	75%	67%	58%	39%
South Atlantic	55%	73%	63%	66%	54%	45%	33%	59%	72%	67%	71%	60%	54%	33%	63%	72%	71%	74%	62%	58%	38%	62%	74%	73%	70%	59%	51%	40%
East South Central	60%	71%	77%	67%	57%	49%	39%	61%	72%	73%	65%	63%	53%	40%	65%	76%	80%	71%	65%	55%	37%	65%	78%	77%	71%	62%	58%	41%
West South Central	56%	83%	74%	67%	49%	38%	41%	61%	72%	70%	72%	59%	52%	38%	61%	78%	72%	72%	58%	49%	36%	64%	72%	78%	68%	63%	56%	36%
Mountain	57%	72%	66%	65%	58%	45%	38%	53%	63%	63%	62%	54%	43%	28%	58%	71%	67%	64%	58%	48%	33%	60%	74%	69%	68%	57%	53%	35%
Pacific	46%	55%	54%	55%	46%	38%	28%	49%	61%	52%	57%	51%	42%	27%	52%	66%	60%	61%	50%	42%	26%	53%	70%	59%	61%	55%	45%	29%
Gender																												
Male	59%	74%	67%	64%	62%	50%	41%	62%	74%	69%	70%	63%	56%	40%	65%	78%	72%	72%	63%	58%	42%	67%	79%	75%	74%	65%	57%	45%
Female	48%	65%	59%	59%	47%	36%	26%	49%	62%	60%	62%	49%	39%	23%	51%	64%	66%	63%	49%	39%	24%	52%	63%	64%	62%	50%	41%	25%
Ethnicity																												
Non-Hispanic	55%	70%	63%	62%	56%	45%	35%	57%	69%	65%	67%	58%	50%	33%	59%	73%	69%	68%	58%	51%	35%	61%	73%	70%	69%	59%	51%	36%
Hispanic	60%	70%	71%	58%	55%	36%	38%	58%	66%	63%	65%	51%	46%	27%	66%	73%	70%	72%	59%	52%	32%	65%	69%	73%	66%	57%	57%	34%
Race																												
White	55%	71%	64%	61%	57%	45%	35%	58%	70%	66%	68%	58%	50%	33%	60%	74%	71%	70%	58%	51%	35%	61%	74%	71%	70%	59%	51%	36%
Black	53%	59%	57%	70%	50%	44%	35%	52%	61%	55%	57%	53%	47%	35%	53%	62%	56%	59%	55%	46%	35%	57%	60%	62%	62%	58%	53%	40%
Other	58%	71%	67%	61%	49%	45%	31%	55%	64%	62%	60%	55%	45%	29%	58%	65%	64%	58%	54%	56%	38%	62%	70%	69%	63%	63%	48%	38%
Annual Household Income (2000 dollars)																												
Under \$25,000	53%	73%	62%	68%	52%	45%	28%	NA	NA	NA	NA	NA	NA	NA	48%	69%	67%	62%	50%	42%	26%	NA						
\$25,000-\$39,999	54%	71%	68%	58%	46%	46%	37%	NA	NA	NA	NA	NA	NA	NA	56%	66%	69%	67%	53%	50%	38%	NA						
\$40,000-\$99,999	59%	72%	66%	64%	61%	47%	39%	NA	NA	NA	NA	NA	NA	NA	64%	76%	71%	71%	62%	53%	40%	NA						
\$100,000 or More	58%	66%	61%	62%	61%	48%	43%	NA	NA	NA	NA	NA	NA	NA	64%	74%	69%	68%	59%	56%	46%	NA						
Population Density																												
Urban Area	51%	67%	60%	57%	52%	41%	30%	54%	66%	61%	63%	54%	45%	29%	56%	70%	65%	64%	55%	46%	31%	58%	70%	69%	65%	55%	49%	33%
Rural Area	64%	78%	76%	74%	65%	54%	44%	66%	78%	78%	75%	66%	59%	43%	67%	81%	82%	78%	63%	59%	42%	67%	79%	76%	78%	68%	56%	42%

Note: Retention Rate is the percent of individuals who have ever fished that participated in the three years prior to 1996 (so 1995, 1994, 1993), 2001, 2006, or 2011 Surveys

**U.S. Department of the Interior
U.S. Fish & Wildlife Service**



March 2015